TITLE OF THE INVENTION

RECORDING MEDIUM PLAYBACK METHOD AND APPARATUS

BACKGROUND OF THE INVENTION

5 ### FIELD OF THE INVENTION

The present invention relates to a recording medium playback method and apparatus which are suitable for use in a disc changer in which optical recording media, such as CD (Compact Disc), VCD (Video Compact Disc) and DVD (Digital

10 Versatile Disc), are installable.

DESCRIPTION OF THE RELATED ART

Today, people often play CDs, which are popular as recording media for music reproduction, to listen to BGM

15 (Back Ground Music) recorded thereon. CDs are therefore suitable for continuous playback. By way of contrast, people often play VCDs and DVDs to enjoy reproducing and watching recorded videos or music on a display monitor, such as a TV monitor. In this respect, VCDs and DVDs usually

20 have interactive contents that allow each user to select a desirable scene and are therefore often unsuitable for continuous playback.

The VCDs have a capability called PBC (Play Back Control) that reproduces video information and voice

25 information recorded on each VCD in the order intended by a person who has produced the video information and voice information, regardless of the recording order. Therefore,

a menu screen which allows a user to select a video to be played and still pictures and moving pictures which provide effective stage effects on recorded video information and voice information are recorded together with the video information, the voice information and PSD (Play Sequence Descriptor) on a video CD which is adapted for the PBC capability.

The DVDs has, as a navigation pack, DSI (Data Search Information) data which is an address for searching for video information or voice information to be reproduced and displayed, and PCI (Presentation Control Information) data which is associated with playback display control that is performed at the time of displaying images or voices detected based on the DSI data. The PCI data includes highlight information that defines the display and operation for each of selectable items, which are activated when a viewer selects their associated item. In accordance with the highlight information, the displayed screen changes for an item selected on an image (menu screen) showing items to be selected by the viewer and the display position to be changed according to the selection and commands or the like for the selected item are set.

A disc changer which is capable of storing plural discs of each of different types, such as the aforementioned CDs, VCDs and DVDs, comes equipped with a so-called custom file capability that preregisters discs, which a user wants to play back, in a custom file and continuously plays back the

discs in the file.

Providing a disc changer capable of storing plural recording media, such as CDs, VCDs and DVDs, with the custom file capability, however, significantly reduces the usability of the disc changer because, as mentioned earlier, CDs are suitable for continuous playback while DVDs and VCDs have contents unsuitable for continuous playback. In the case where VCDs or DVDs are stored together with CDs in the disc changer, for example, when the disc changer is set to the continuous playback mode, continuous playback is interrupted by a menu screen or the like. Therefore, some schemes or ideas are needed to register a mixture of discs of different properties in a custom file.

SUMMARY OF THE INVENTION

Accordingly, it is an object of the present invention to provide a recording medium playback method and apparatus with an improved usability which are for use in a disc changer capable of storing recording media of different properties, and which generate a custom file for each of the properties of the recording media, designate a generated custom file and instruct playback of the recording media registered in the designated file to thereby continuously play back the registered recording media.

To achieve the object, according to one aspect of this invention, there is provided a recording medium playback method for a recording medium playback system in which a

first recording medium having reproduction information recorded thereon and a second recording medium on which reproduction information and playback control information for controlling a playback order of that reproduction

5　information are recorded are both installable and which plays back the first and second recording media, which method comprises the steps of generating a custom file having at least the first recording medium alone registered therein; and playing back the first and second recording

10　media installed in the recording medium playback system in accordance with registered contents of the custom file.

According to a first preferable mode of the recording medium playback method, the recording medium playback system determines a type of a recording medium to be stored in the

15　recording medium playback system and generates a management table including type information of the recording medium; and upon reception of an instruction of registering the recording medium as a custom file, the type of the recording medium is determined by referring to the management table

20　and the recording medium is registered in a custom file to be assigned in association with the type.

According to a second preferable mode of the recording medium playback method of the first preferable mode, when a recording medium registering instruction is issued during

25　playback of the recording medium, the type of the recording medium which is being played back is determined by referring to the management table and the recording medium is

registered in a custom file to be assigned in association with the type.

According to a third preferable mode of the recording medium playback method of the first preferable mode, a selection menu for custom files where registration is to be made is displayed to prompt a user to select a custom file, a list of those of recording media stored in the recording medium playback system which are registrable is displayed by referring to the management table, and when a recording medium to be registered is selected from the list, the selected recording medium is registered in the selected custom file.

According to a fourth preferable mode of the recording medium playback method of the first preferable mode, the method further comprises the steps of receiving an instruction of designating a custom file and a recording medium to be registered in the custom file; waiting for an input of data about the custom file and the recording medium; checking if the designated recording medium matches with classification of the designated custom file by referring the management table; and registering the designated recording medium in the designated custom file when there is a match.

The usability of a disc changer capable of storing recording media of different properties is improved by generating a custom file for each of the properties of the recording media, designating a generated custom file and

instructing playback of the recording media registered in the designated file to thereby continuously play back the registered recording media. When a custom file in which only recording media suitable for continuous playback can be

5 registered is designated and playback of the recording media is designated, particularly, continuous playback will not be interrupted.

There are three ways of registering a custom file. The first way is to register a disc being played directly in a

10 custom file. The second one is to display a list of individual recording media stored in a playback system to prompt a user to make a selection when a registration instruction is issued. The last one is to check if a designated recording medium matches with the classification

15 of a designated custom file and invalidate registration when registration of a first recording medium into the custom file of a second recording medium is instructed.

According to another aspect of this invention, there is provided a recording medium playback apparatus for a

20 recording medium playback system in which a first recording medium having reproduction information recorded thereon and a second recording medium on which reproduction information and playback control information for controlling a playback order of that reproduction information are recorded are both

25 installable and which plays back the first and second recording media, which apparatus comprises control means for generating a custom file having at least the first recording

medium alone registered therein; and playback means for playing back the first and second recording media installed in the recording medium playback system in accordance with registered contents of the custom file.

According to a first preferable mode of the recording medium playback apparatus, the control means includes management-table generating means for determining a type of a recording medium to be stored in the recording medium playback system and generating a management table including type information of the recording medium; and custom-file generating means for determining the type of the recording medium by referring to the management table upon reception of an instruction of registering the recording medium as a custom file, and registering the recording medium in a custom file to be assigned in association with the type.

According to a second preferable mode of the recording medium playback apparatus of the first preferable mode, when a recording medium registering instruction is issued during playback of the recording medium, the custom-file generating means determines the type of the recording medium which is being played back by referring to the management table and registers the recording medium in a custom file to be assigned in association with the type.

According to a third preferable mode of the recording medium playback apparatus of the first preferable mode, the apparatus further comprises menu display means for displaying a selection menu for custom files where

registration is to be made to thereby prompt a user to select a custom file; and list display means for displaying a list of those of recording media stored in the recording medium playback system which are registrable by referring to the management table, whereby when a recording medium to be registered is selected from the list, the custom-file generating means registers the selected recording medium in the selected custom file.

According to a fourth preferable mode of the recording medium playback apparatus of the first preferable mode, the apparatus further comprises instruction receiving means for receiving an instruction of designating a custom file and a recording medium to be registered in the custom file; input receiving means for waiting for an input of data about the custom file and the recording medium; and means for checking if the designated recording medium matches with classification of the designated custom file by referring the management table, whereby the custom-file generating means registers the designated recording medium in the designated custom file when there is a match.

With the above-described structure, as the control means generates a custom file for each of the properties of the recording media, designates a generated custom file and instructs playback of the recording media registered in the designated file to thereby play back the registered recording media continuously or at random, the usability of a disc changer which can store recording media of different

properties and where the invention is adapted is improved.

In the case where discs suitable for continuous playback, such as CDs, and discs unsuitable for continuous playback, such as DVDs and VCDs, are stored in a disc changer, therefore, when the custom file capability that preregisters desirable discs in a custom file and continuously plays back the discs registered in the file is used, a disc unsuitable for continuous playback and a disc suitable for continuous playback will not be registered in a single file. Even when the disc changer is instructed to perform continuous playback, therefore, continuous playback is not be interrupted, thus preventing a user from being irritated by such a break. This leads to an improved usability. When a custom file in which only recording media suitable for continuous playback can be registered is designated and playback of the recording media is designated, in particular, continuous playback will not be interrupted.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 is a diagram showing the outer structure of a recording medium playback system to which the present invention is adapted;

FIG. 2 is a flowchart illustrating one example of registering a custom file;

FIG. 3 is a flowchart illustrating another example of registering a custom file;

FIG. 4 is a flowchart illustrating a further example of

registering a custom file;

FIG. 5 is a diagram exemplifying the structure of a screen for a direct custom input mode;

FIG. 6 is a diagram exemplifying the structure of a audio custom file;

FIG. 7 is a diagram exemplifying the structure of a video custom file;

FIG. 8 is a diagram exemplifying the structure of a screen for a custom-file selection menu in association with the flowchart shown in FIG. 3;

FIG. 9 is a diagram exemplifying the structure of a screen for a disc selection menu in association with the flowchart shown in FIG. 3;

FIG. 10 is a diagram exemplifying a management table which is generated in a disc auto update process;

FIG. 11 is a diagram showing one example of a screen structure in a custom mode;

FIG. 12 is a flowchart illustrating the outline of the disc auto update process; and

FIG. 13 is a block diagram schematically depicting the internal structure of a disc changer shown in FIG. 1.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENT

A preferred embodiment of the present invention will now be described with reference to the accompanying drawings.

FIG. 1 is a diagram showing the outer structure of a recording medium playback system to which the invention is

adapted, and FIG. 13 presents a block diagram depicting the

internal structure of a disc changer 1. The disc changer 1

is capable of storing plural discs of different types, such

as the aforementioned CDs, VCDs and DVDs. Reference numeral

5   "2" denotes an image and voice monitor, such as a TV with

speakers or the like. A keyboard 3 and a remote controller

4 serve to generate an operational instruction to the disc

changer 1. Reference numeral "5" denotes a mouse which is

used to select individual items on a menu.

10   In FIG. 13, the disc changer 1 comprises a control

section 101 as the control center, a memory section 102, a

disc in/out detecting section 103, a servo section 104, a

disc feeding section 105, a playback section 106, a spindle

motor 107, a pickup 108 and a disc storage section 109. The

15   disc storage section 109 stores a mixture of discs suitable

for continuous playback, such as CDs, and discs unsuitable

for continuous playback, such as VCDs and DVDs. A program

is stored in the memory section 102. The memory section 102

is used as a work area which is used when the program is

20   executed and where, for example, a custom file to be

discussed later is registered or various disc information

including a management table to be discussed later is set

and stored.

The control section 101 controls the individual

25   functional blocks 103, 104, 105 and 106 in accordance with

the program stored in the memory section 102. Specifically,

the control section 101 detects inputs made through the

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keyboard 3, remote controller 4, mouse 5 or the like, and fetches information that is acquired through the disc in/out detecting section 103 which is comprised of a sensor. The control section 101 performs optimal control of the servo

5   section 104 to drive the spindle motor 107 and pickup 108. The control section 101 also controls the disc feeding section 105 to load a disc into the disc storage section 109 or unload a disc therefrom. The playback section 106 demodulates a recorded signal which is read by the pickup

10   108, performs D/A conversion of the recorded signal and sends the resultant digital signal to the image and voice monitor 2 (not shown in FIG. 13).

With the above-described structure, when a user depresses an auto update key (not shown) located on the

15   front panel of the disc changer 1, an auto update operation is carried out to read information of discs stored in the disc changer 1 and register the disc information in the memory section 102.

There are two types of auto updating: additional update

20   that updates only a disc which has been added since the depression of the key and all update that updates all the discs stored in the disc changer 1. In this operation, either the additional update or the all update is selected. In the additional update, disc information is read and the

25   flow proceeds to a mode of inputting a title and the name of an artist for each disc. In the case of a text disc, such as a CD text disc, recorded text information is displayed.

In the case of a DVD text disc, there are plural items for an artist, so that a desirable item is selected from the screen. In the case of other types of discs, the user inputs a title and an artist's name using the keyboard 3.

5   The title and artist's name input this time are stored linked to disc information to be discussed later. Even when a disc storage address in the disc storage section 109 in the disc changer 1 is changed, reading disc information allows a given name to be automatically set. The entry or

10   selection of each name is carried out using the keyboard 3 or the mouse 5.

The additional update operation will now be described with reference to a flowchart shown in FIG. 12. This operation is executed by the control section 101

15   incorporated in the disc changer 1. First, the control section 101 determines whether there is an additional update instruction or not (step S121). When there is the additional update instruction, the control section 101 detects if there are discs in the disc storage section 109

20   in the disc changer 1 (step S122). When there are no discs, the additional updating is terminated. When there are discs in the disc storage section 109 in the disc changer 1, the control section 101 checks if each disc in the disc storage section 109 is a newly added one (step S123). In this

25   embodiment, for example, disc in/out information of a disc at each storage position in the disc changer 1 has been stored in the memory section 102 beforehand, it is

determined in step S122 whether there is a disc or not, and when there is a disc at a new disc storage location which has not been existed before, the disc is recognized as a newly added one.

5   The control section 101 further determines the type of the disc (step S124). Specifically, the control section 101 determines whether there is a disc or not by detecting the S amplitude of a focus error obtained via the pickup 108. When it is determined that there is a disc, the disc is

10   turned in the mode where a DVD is played (each servo gain, read laser wavelength, etc.) to attempt reading recorded information. When recorded information is read, it is determined that the disc is a DVD, whereas when no recorded information is readable, the disc is turned in the mode of

15   playing a CD. When recorded information is read, it is determined that the disc is a CD. It is further determined whether the disc is a CD or a VCD by reading a subcode. To identify each disc stored in the disc storage section 109 in the disc changer 1, an identification (ID) information

20   specific to each disc is read (step S125). In this example, the first track number (FINO), last track number (LTNO), a lead-out time (LOT), etc. of each disc should be stored as the ID information in the memory section 102 beforehand.

       Next, it is determined whether the read ID information

25   has already been registered in the memory section 102. When the ID information is already in the memory section 102, the flow proceeds to step S127, otherwise the flow proceeds to

step S128. In step S127, a title and the name of an artist
in the memory section 102 are added. In step S128, the
title and artist's name are added for each newly added disc.
In the case of a CD text disc or DVD text disc, for example,
those pieces of information have already been stored on the
disc, so that the information may be added or the user may
input the information for that disc. In the case of a text
disc where plural pieces of artist information are recorded
on the single disc, the user may be able to select one piece
of the artist information as an artist's name.

The process of the steps S126 and S127 does not erase
disc information (disc type, disc title, artist's name, type
ID) of one disc updated and registered in the memory section
102 when that disc is unloaded from the disc changer 1, and
automatically adds the ID information and disc information
of the disc remaining in the memory section 102 even if the
same disc is reloaded into the disc changer 1 (the storage
location may differ from the previous one) and is actually a
newly added disc. Apparently, discs are managed based on,
not storage locations, but ID information. It is therefore
unnecessary to add the title and artist's name every time an
updated disc is changed.

The control section 101 further determines whether all
the update of the newly added disc has been completed or not
(step S129). When the updating has been completed, the
additional update process is terminated. When the updating
has not been completed yet, a process for a disc at the next

storage location is performed (step S130).

FIG. 10 exemplifies the registered contents of individual discs in the disc changer 1 after updating. In the following description, the registered contents will be called a management table. In the management table, the "Disc" column indicates disc storage positions, the "Type" column indicates disc types, the "Title" column indicates disc names, the "Artist" column indicates the names of artists, and the "ID" column indicates disc ID information (FTNO, LTNO, LOT).

A description will now be given of the custom file capability that is the feature of the invention. It is assumed that a predetermined number of (e.g., ten) custom files can be registered for each of audio and video discs and each file can store a predetermined number of discs (e.g., 300 discs). Each custom file is labeled with characters.

FIGS. 6 and 7 respectively exemplify the structures of an audio custom file and a video custom file. In the figures, the "Type" column indicates the classification of the audio custom file or video custom file, the "No." column shows file numbers and the "Title" column shows file names.

FIGS. 2 through 4 respectively illustrate three ways of registering a custom file in the form of flowcharts. Referring to FIGS. 2-4, disc registration in each custom file will be discussed. In any of the schemes, the control section 101 in the disc changer 1 executes the registration.

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(Registration Scheme 1)

　　　　In the flowchart shown in FIG. 2, the control section
101 first determines whether or not a key (direct custom
key) for directly registering a disc being played in a
5　　custom file has been depressed by manipulating the remote
controller 4 or the keyboard 3 or manipulating the mouse 5
on a menu screen (step S21).　When the direct custom key has
been depressed, a screen display as shown in, for example,
FIG. 5 is made to prompt the user to enter a file number.
10　　Further, the control section 101 waits for the depression of
a numerical key corresponding to the file number of a custom
file (step s22).　When such a numerical key is depressed,
the flow proceeds to step S23.

　　　　In step S23, it is determined whether a disc is being
15　　played or not.　When the disc is being played, the flow
proceeds to step S24, otherwise the flow proceeds to step
S28.　In step S24, it is determined whether the disc being
played is a DVD or not.　When the disc is a DVD, the flow
proceeds to step S29.　Otherwise the flow proceeds to step
20　　S25.　In step S29, the disc that is being played is
registered in a video file after which the custom-file
registering process is terminated.　In step S25, it is
determined whether the disc that is being played is a VCD.
When the disc is a VCD, the flow proceeds to step S29,
25　　otherwise the flow proceeds to step S26.

　　　　In step S26, it is determined whether the disc that is
being played is a CD.　When the disc is a CD, the flow

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proceeds to step S27, otherwise the custom-file registering process will be terminated.

(Registration Scheme 2)

In the flowchart shown in FIG. 3, first, the control section 101 determines whether or not there is an instruction to display a menu (custom-file selection menu) screen for allowing the user to designate and select a custom file where registration is to be made (step S31). When there is the instruction, the custom-file selection menu is displayed (step S32). When the instruction has not been made, the custom-file registering process will be terminated.

As shown in, for example, FIG. 8, the custom-file selection menu is so designed as to allow a cursor (hatched bar in the diagram) to move to select each custom file using the keyboard 3, the remote controller 4 or the mouse 5. In the diagram, the "Type" column indicates whether a custom file is an audio file or a video file, the "No." column gives file numbers and the "Title" column gives file names. As the cursor is kept depressed on the menu, video files 1 to 10 and audio files 1 to 10 are scrolled sequentially.

In step S33, the control section 101 waits for the user to select a custom file where registration is to be made using the custom-file selection menu and to set the file by the depression of a set key. When the selected file is set, the flow proceeds to step S34. In step S34, a menu for selecting a disc to be registered is displayed. This menu

shows only those discs which are registrable in the selected

custom file. When a custom file for which the disc type is

"Video" is selected, for example, only those discs which are

not suited for continuous playback, such as DVDs and VCDs,

5   are displayed. When a custom file for which the disc type

is "Audio" is selected, for example, only those discs which

are suited for continuous playback, such as CDs, are

displayed. The disc selection menu, as shown in, for

example, FIG. 9, is comprised of a list of discs present in

10   the disc changer 1 and a cursor (hatched bar in the diagram)

which allows the user to select each disc. The user should

move the cursor on the desired disc to be registered.

In step S35, the control section 101 waits for the user

to select a disc to be registered in the previous disc

15   selection menu and to set the disc by the depression of the

set key. When the selected disc is set, the flow proceeds

to step S36. In FIG. 9, the "R" column indicates whether an

instruction to fix the registration has been made

(registration fixing is instructed by a mark "ν"), the

20   "Disc" column shows the storage positions of discs in the

disc changer 1, the "Title" column gives file names, and the

"Artist" column gives artist names. In step S36, the

selected disc is registered in the selected custom file.

(Registration Scheme 3)

25   In the flowchart shown in FIG. 4, first, the control

section 101 determines whether or not there is an

instruction to set a custom mode to directly designate a

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custom file and a disc (step S41). When there is the
instruction, the control section 101 waits for a custom file
number to be entered. When the instruction has not been
issued, the custom-file registering process will be

5   terminated. In the custom mode, a screen as shown in FIG.
11, for example, is displayed.

The control section 101 first waits for the entry of
the number of a custom file where registration is to be made
(step S42). When there is such an entry, the flow proceeds

10   to step S43. The control section 101 further waits for the
entry of the storage position (disc address) for a disc to
be registered (step S43). When there is such an entry, the
flow proceeds to step S44. In step S44, the control section
101 determines whether or not the classification (audio or

15   video) of the custom file designated in step S42 matches
with the classification (DVD, CD or VCD) of the disc at the
disc address designated in step S43. When there is a match,
the flow proceeds to step S45. When there is no match, the
flow returns to step S43 to wait again for the entry of a

20   disc address. In step S45, the designated disc is
registered in the designated custom file.

The custom file where registration has been made is
used in such a way as to be reproduced at random between
discs registered in the designated file by playing the discs

25   registered n the designated file in the registered order, or
designating a custom file and instructing random playback.

Although the foregoing description has been given of

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the example of registering discs unsuitable for continuous

playback, such as VCDs and DVDs, in a video file and

registering discs suitable for continuous playback, such as

CDs, in an audio file, the invention is not limited to this

5   particular case. Discs which contain information for

controlling the playback order may be registered in a video

file.

Although the foregoing description has been given of

the case where an audio file and video file are both

10   prepared as custom files, only a custom file for registering

just discs suitable for continuous playback may be prepared

and designated for continuous playback. This modification

can also provide the same effect of preventing continuous

playback from being interrupted.

15   As apparent from the foregoing description, the

invention improves the usability of a disc changer capable

of storing recording media of different properties by

generating a custom file for each of the properties of the

recording media, designating a generated custom file and

20   instructing playback of the recording media registered in

the designated file to thereby play back the registered

recording media continuously or at random.

In the case where discs suitable for continuous

playback, such as CDs, and discs unsuitable for continuous

25   playback, such as DVDs and VCDs, are stored in a disc

changer, therefore, when the custom file capability that

preregisters desirable discs in a custom file and

continuously plays back the discs registered in the file is used, a disc unsuitable for continuous playback and a disc suitable for continuous playback will not be registered in a single file. Even when the disc changer is instructed to perform continuous playback, therefore, continuous playback is not be interrupted, thus preventing a user from being irritated by such a break. This makes the disc changer 1 easier to use.

While there has been described what are at present considered to be preferred embodiments of the present invention, it will be understood that various modifications may be made thereto, and it is intended that the appended claims cover all such modifications as fall within the true spirit and scope of the invention.